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InfraStruXure Type B

80kW

UPS Distribution to Rack

Power Distribution in Rack

Installation and Start-up Manual

208/480/600V

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Safety

Overview

Safety symbols used in this guide

Indicates a hazard, which, if not avoided, could result in injury or death.

Indicates a hazard, which, if not avoided, could result in damage to a product or other property.

Indicates important information.

Indicates a heavy load that should not be lifted without assistance.

Indicates that more information is available on the same subject in a different section of this manual.

Indicates that more information is available on the same subject in a different manual.

SAVE THESE INSTRUCTIONS. This manual contains important instructions that must be followed during installation and maintenance of the InfraStruXure system.

Warnings

Installation/Maintenance

Only a certified electrician can perform these tasks:

- Connect the PDU to utility
- Connect a switch to the EPO interface on the PDU

Only a certified electrician or an APC Field Service Engineer can perform these tasks:

- Connect the PDU to the Symmetra PX UPS
- Perform maintenance on the PDU

When you connect the PDU to utility, you must install a circuit breaker to protect the PDU against short-circuit current.

Determine the type of circuit breaker that you need to install:

Input Voltage	Circuit Breaker Sizing
208 V	360 A
480 V	150 A
600 V	125 A

Maintenance performed while the PDU is receiving input power

APC does not recommend that you perform maintenance of the PDU while it is receiving input power. If you must perform maintenance while the PDU is receiving input power, observe the following precautions to reduce the risk of electric shock:

1. Never work alone.
2. Perform the maintenance only if you are a certified electrician who is trained in the hazards of live electrical installation.
3. Know the procedure for disconnecting electricity to the PDU and the data center in case of an emergency.
4. Wear protective eye gear, rubber-insulated gloves, and rubber-insulated boots.
5. Use double-insulated tools.
6. Always follow local and site regulations when working on the PDU.

Total Power Off

1. Set the Symmetra PX UPS **System Enable** switch to Off.
2. Set the **DC Disconnect** breaker of each Battery Enclosure to Off.
3. Set the PDU **Main Input** (**A**) switch to Off.
4. If applicable, set the PDU Q10 **Bypass Input** (**B**) switch to Off.
5. Set the upstream utility circuit breaker to Off.
6. Disconnect the batteries in the Battery Enclosure by pulling them out approximately 25 mm from their normal position.

DANGER—Risk of Electric Shock!

Hazardous, live parts may exist inside the PDU because of the Symmetra PX UPS inverter even when the AC power is disconnected. Test any electrical parts before touching them.

Emergency Power Off (EPO)

Hazardous voltage from the branch circuit must be isolated from the 24 VAC, 24 VDC and contact closure. 24 VAC and 24 VDC are considered Class 2 circuits as defined in Article 725 of the National Electrical Code (NFPA 70) and Section 16 of the Canadian Electrical Code (C22.1).

A Class 2 circuit is a source having limited voltage and energy capacity as follows:

a. If an Inherently Limited Power Source, voltage and energy are limited to < 30 VAC, < 60 VDC, 8 A.

b. If Not an Inherently Limited Power Source, voltage and energy are limited to < 30 VAC, < 60 VDC, 250 VA, and the current is limited to 1000/Vmax. The fuse is limited to 5 A if < 20 VAC or 20 VDC, or 100/Vmax if < 30 VAC or 60 VDC.

If you choose to use a 24 VAC, 24 VDC or contact closure connection to the EPO, use one of the following UL-Listed wire types:

- CL2 Class 2 cable for general purpose use; or
- CL2P Plenum cable for use in ducts, plenums and other space used for environmental air; or
- CL2R Riser cable for use in a vertical run shaft from floor to floor; or
- CL2X Limited Use cable for use in dwellings and for use in raceway.
- For installation in Canada, the cable should be CSA Certified, type ELC (extra-low-voltage control cable).

If you do not use a CL2 cable, route the EPO wiring in conduit that does not contain any hazardous branch circuit wiring.

EMI

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. The user will bear sole responsibility for correcting such interference.

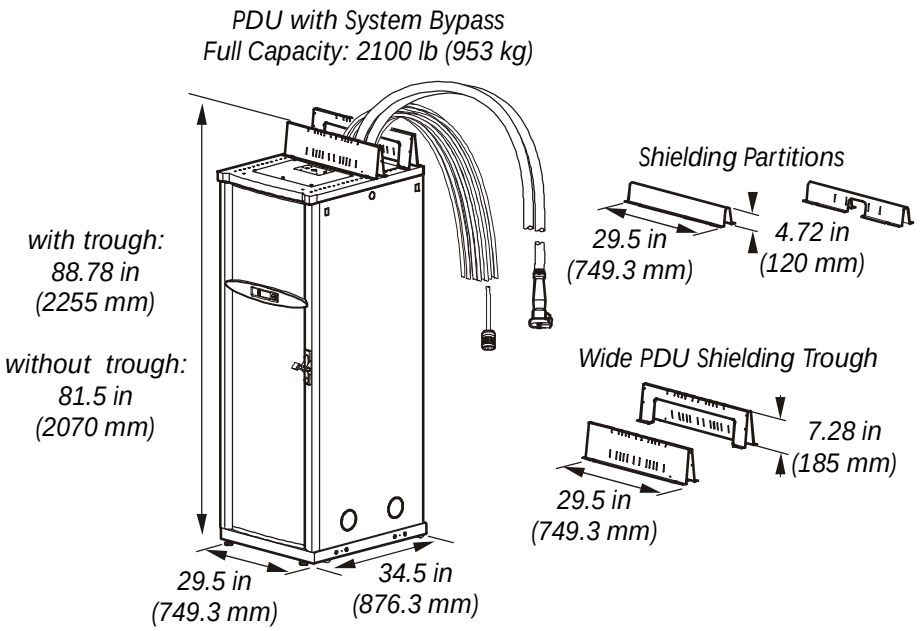
This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de le class A est conforme a la norme NMB-003 du Canada.Site Planning

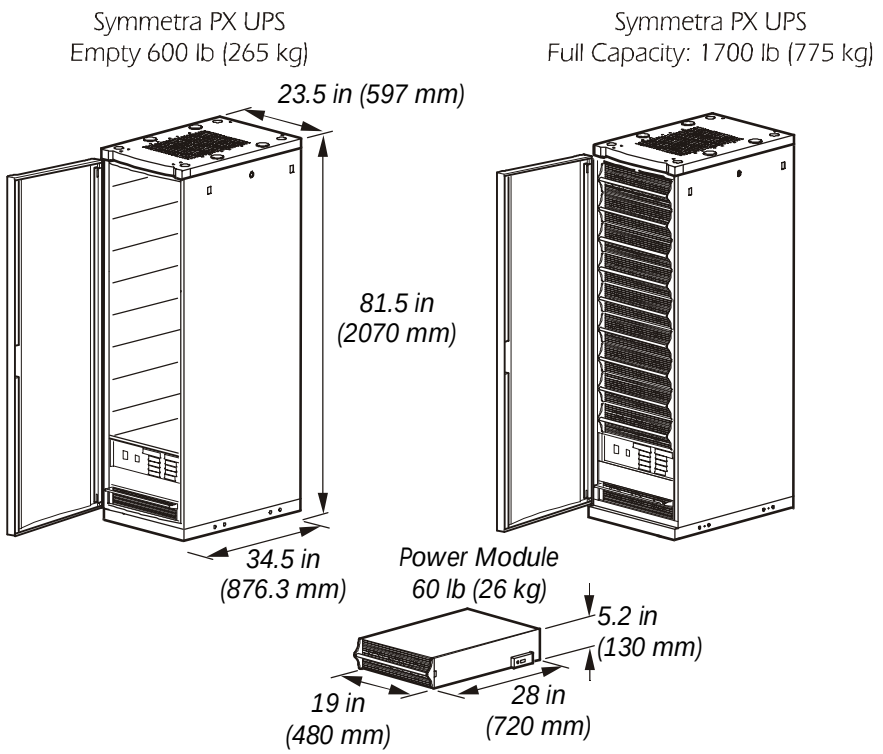
Site Planning

Weight and Dimensions

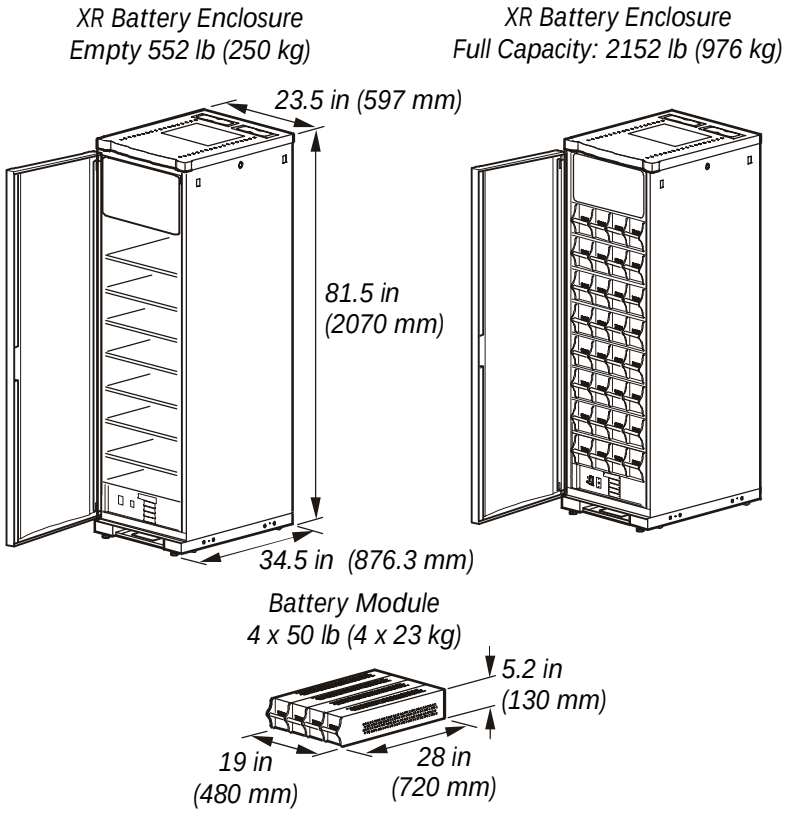
PDU with System Bypass



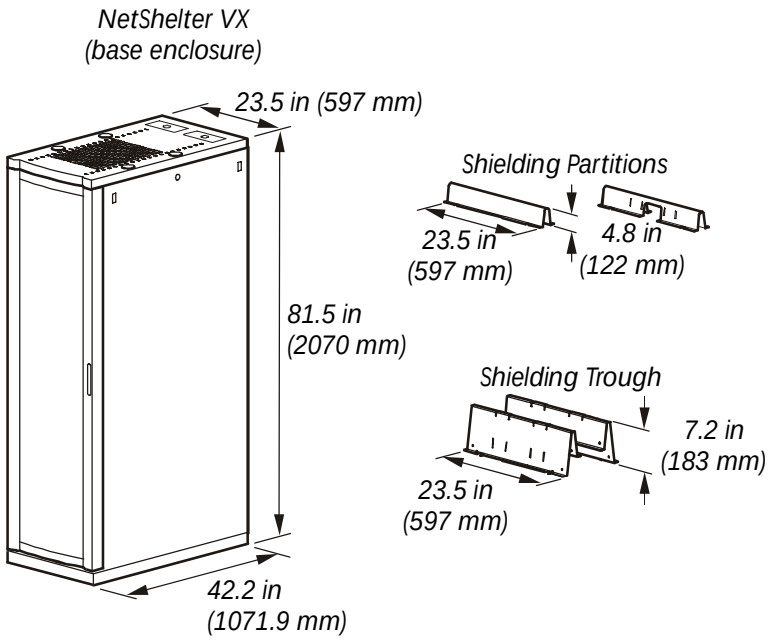
Symmetra PX UPS



Battery Enclosure

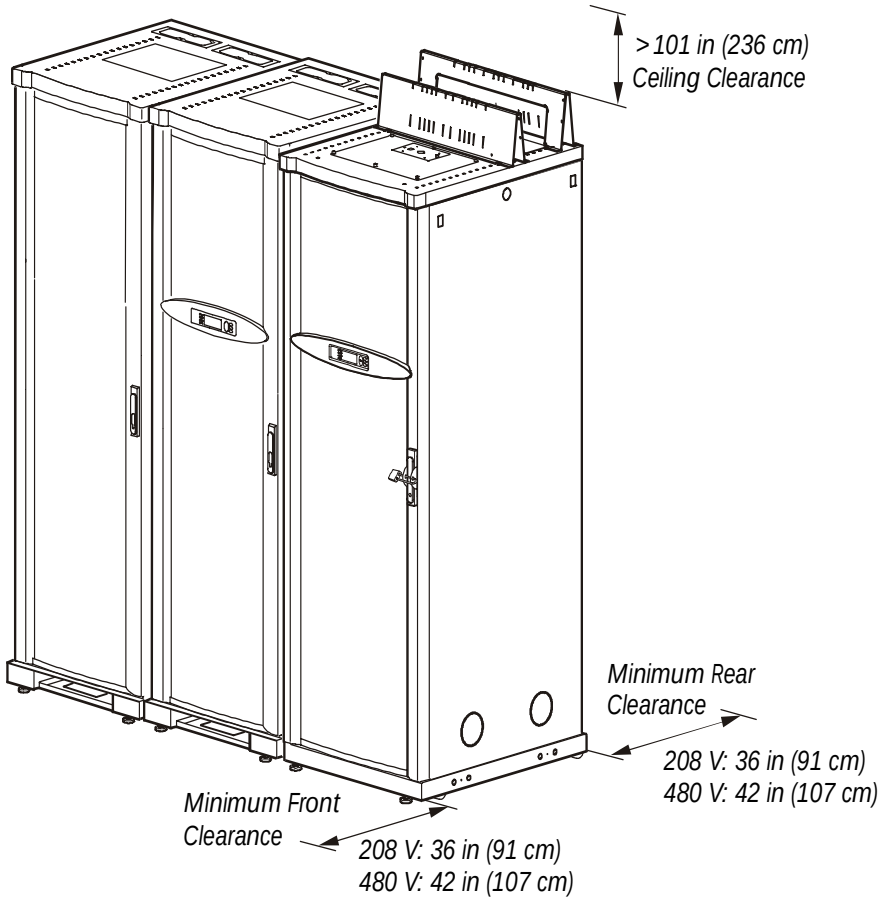


NetShelter VX Enclosure



Space Considerations

Study the figures below to determine your space requirements for installing the PDU with System Bypass, Symmetra PX UPS, and Battery Enclosure. Consult your local codes and the NEC for additional requirements.



Weight Considerations

Ensure that the floor and subfloor can support the total weight of the configuration when concentrated on the leveling feet. If you are placing equipment on a raised floor, consult the flooring manufacturer for loading requirements before installing equipment.

Component	Maximum Weight
PDU with System Bypass	2100 lb (953 kg)
Symmetra PX UPS	1700 lb (775 kg)
Battery Enclosure	2152 lb (976 kg)
NetShelter VX Enclosure (empty)	363 lb (165 kg)

Heat Output

Consider the heat dissipation ratings of equipment to determine cooling requirements. Additional cooling equipment may be required. Heat output of the PDU with System Bypass and Symmetra PX UPS is shown below.

Component	BTU/hr		
PDU with System Bypass	208 V: 9,290	480 V: 9,234	600 V: 6,850
Symmetra PX UPS	23,222		

Note

The heat output is higher while batteries are charging. Under normal operating conditions, battery recharging periods are infrequent.

Electrical Requirements and Specifications

Procedures requiring a licensed electrician

A licensed electrician must connect utility power. Procedures requiring a licensed electrician include:

- **connection of utility conductors**
- **installation of a 360-, 150-, or 125-amp circuit breaker**
- **connection to the main input switch**
- **connection to a branch circuit**

To connect utility power, see the utility connection instructions included with your PDU documentation.

Upstream breaker sizing requirements

When you connect the PDU with System Bypass to utility, you must install a circuit breaker to protect the PDU with System Bypass from short-circuit current.

Input Voltage	Circuit Breaker Sizing
208 V	360 A
480 V	150 A
600 V	125 A

Basic Installation Procedure

This section provides the basic steps that you need to perform when installing InfraStruXure Type B power and rack components. Follow the references provided with each step for detailed instructions.

Warning

Do not begin installing your InfraStruXure system without an APC Field Service Engineer present.

1. Unpack the components, according to the unpacking instructions included on the outside of the packaging or in the component's manual.

   Note

   Be sure to search all boxes and packaging to make sure that they are empty before discarding.

2. Determine the correct placement of your system components by studying your CTO report. Move the Symmetra PX UPS, PDU with System Bypass, Battery Enclosure, and NetShelter VX Enclosures to their final site.

   Warning

   If installing InfraStruXure on a raised floor, make sure that the raised-floor structure has a lbs/in^2 rating that will support the full weight of the InfraStruXure installation. See "Weight Considerations" on page 8.

3. Level the PDU, UPS, RDP, NetShelter and Battery Enclosures.

   See page 15 for detailed instructions.

4. Exchange side panels and run battery communication cables.

   See page 16 for detailed instructions.

5. Join adjacent enclosures.

   For instructions on joining the PDU, UPS, and Battery Enclosure see page 15.

   See also

   For instructions on joining adjacent NetShelter VX Enclosures, see the installation manual included with your enclosures.

6. Ensure total power off.

   See page 19 for detailed instructions.

7. Connect utility power to the PDU.
   A licensed electrician must connect utility power.

   See also

   For instructions, see the utility connection instruction sheet included with your PDU documentation.

8. Connect AC power and control wiring.

   See page 20 for detailed instructions.

9. Connect DC power wiring, if applicable.

   See page 24 for detailed instructions.

10. Connect an EPO switch to the PDU monitoring unit's user connection plate.

    See page 27 for detailed instructions.

11. Install Shielding Troughs, Shielding Partitions, and Cable Ladders.

    See page 30 and page 34 for detailed instructions.

12. Install the Rack Automatic Transfer Switches (ATS), Rack Power Distribution Units, and other InfraStruXure rack-mount devices.

    See also

    For instructions, see the manuals included with your Rack ATS, Rack PDU, or other InfraStruXure rack-mount device.

13. Route and attach power cables to RDPs and to each Rack ATS and/or Rack PDUs.

    See page 37 for detailed instructions.

14. Route and attach communication cables to the InfraStruXure Manager hub (or switch).

    See page 42 for detailed instructions.

15. Start the system.
    Only qualified, APC-trained personnel may perform a system start-up.

    See page 43 for detailed instructions.

16. Configure the InfraStruXure Manager.

    See also

    For instructions, see the manual included with your InfraStruXure Manager.

Tools Required

The following list of tools is required to perform the procedures in this manual Additional tools may be required for components not covered in this manual.

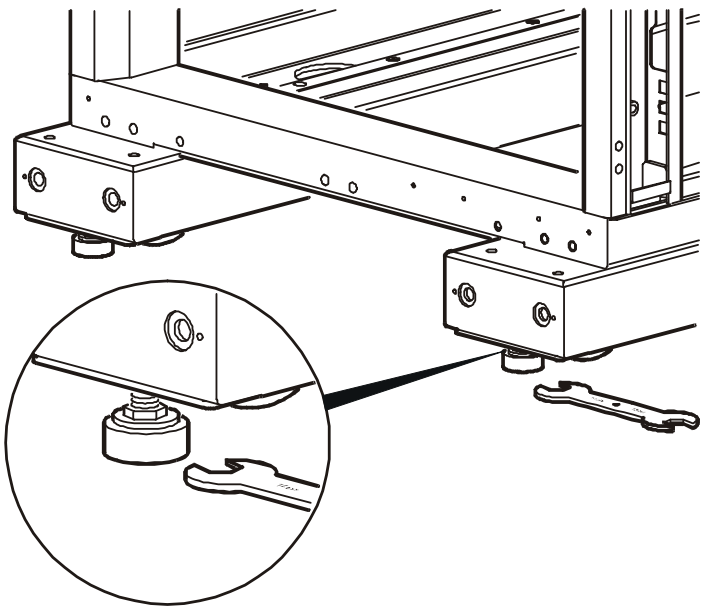
Tool	Supplied?
13 mm socket wrench	No
17 mm socket wrench	No
T-20 screwdriver	No
Standard screwdriver	No
Level	No
Open-ended wrench (14 mm) for adjusting the leveling feet	Yes
Step ladder	No
Crimper	No

Installation Procedures

Level the PDU, UPS, RDP, NetShelter and Battery Enclosures

Leveling feet are attached under the enclosure at each corner. The leveling feet can help provide a stable base if the selected floor space is uneven, but they are not intended to compensate for a badly sloped surface. To level the enclosure:

1. Fit the 14-millimeter end of the open-ended wrench (included) to the hex head just above the round pad on the bottom of the leveling foot. Turn the wrench clockwise to extend the leveling foot until it makes firm contact with the floor.

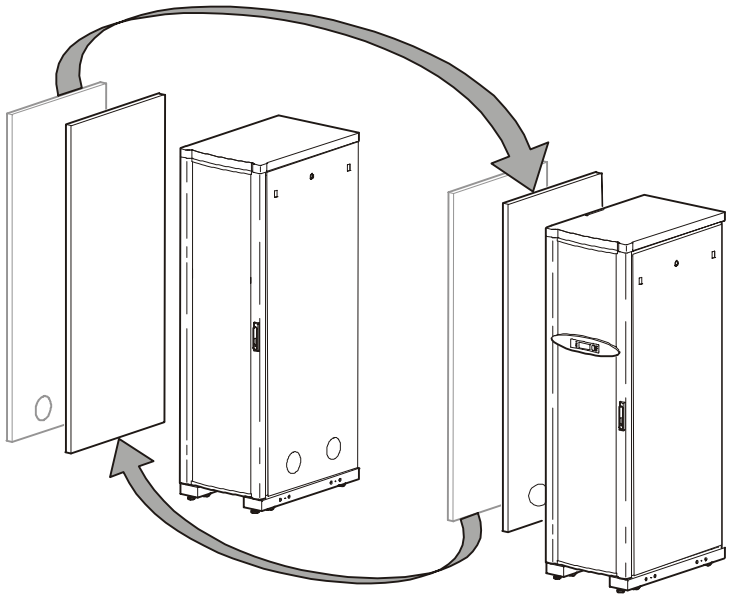


2. Repeat step 1 for each of the remaining leveling feet.
3. Use a level to determine which feet need further adjustment to level the enclosure. Adjust as necessary.

Exchange Side Panels

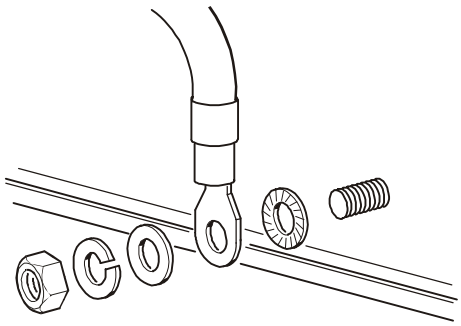
Before installing the PDU with System Bypass, Symmetra PX UPS, and Battery Enclosure, you will need to exchange side panels so that the **adjacent** panels will have matching holes for joining the enclosures together and for routing input and output wiring between them. The following side panels will need to be exchanged:

- Adjacent side panels of a PDU and UPS
- Adjacent side panels of an Battery Enclosure and a UPS
- Adjacent side panels of two Battery Enclosures

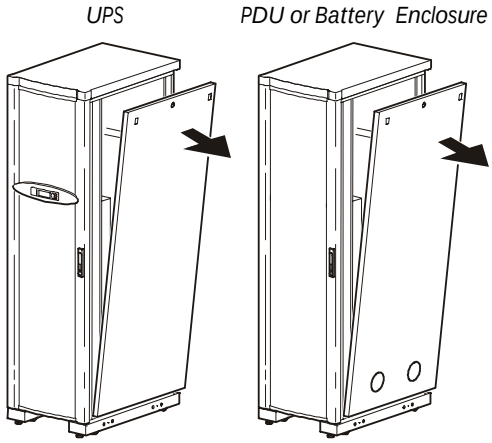


To exchange side panels, follow the instructions below.

1. Detach the ground wires from the side panels that you will be exchanging.



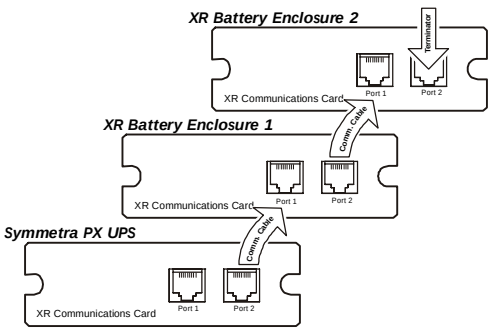
2. Remove the solid side panels from the sides of the UPS that will be adjacent to the PDU and the Battery Enclosure in your planned configuration.
3. Remove the side panels from the sides of the PDU and Battery Enclosure that will **not** be adjacent to the UPS.

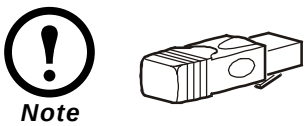


4. Remove the rear hole covers from the panels that you removed in step 3.

Connect Battery Enclosure Communication Cables:

5. Route the communication cable through the hole between the UPS and the Battery Enclosure. Route the cable from the side of the UPS to which it is attached, around the back of the UPS, through the hole on the other side of the UPS, and to the front of the Battery Enclosure.
6. Connect the cable to **Port 1** on the first adjacent Battery Enclosure's XR Communication Card.
7. Connect **Port 2** on the first Battery Enclosure to **Port 1** on the next Battery Enclosure. Route the cable the same as described in step 5. Continue until all XR Communication Cards are connected.
8. Locate the XR Communication Card terminator and insert it into the open port of the last Battery Enclosure in your configuration.





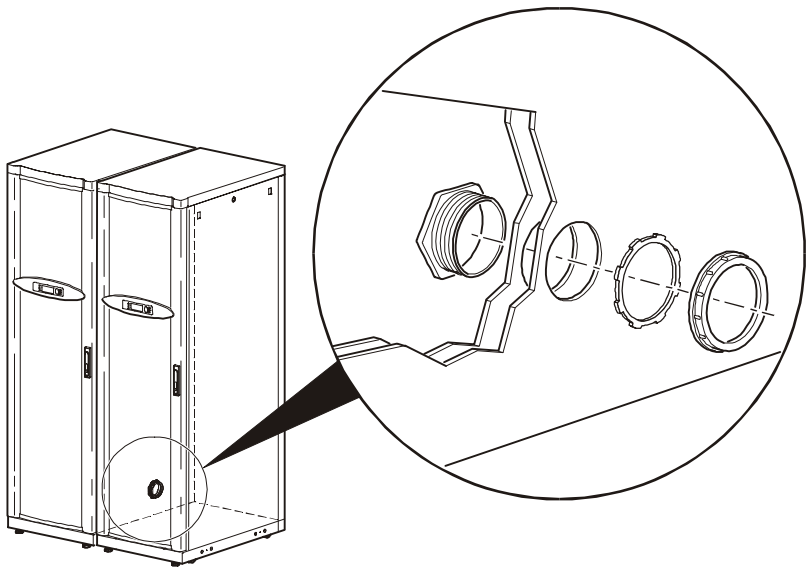
Note

The terminator is in Port 1 of the UPS XR Communication Card and in Port 2 of the Battery Enclosure XR Communication Card.

9. Install, on the UPS, the side panels that you removed from the PDU and the Battery Enclosure in step 3.
10. Install, on the PDU and the Battery Enclosure, the solid side panel that you removed from the UPS in step 2.

Attach the PDU, UPS, and Battery Enclosure

1. Move the PDU, Symmetra PX UPS, and Battery Enclosures into position, aligning the holes in the adjacent side panels.
2. Level the PDU, Symmetra PX UPS, and Battery Enclosure, by using a level and adjusting the leveling feet on each enclosure.
3. Thread the chase nipple (part number: 820-0071), through the opening in the adjacent side panels of the enclosures. The following enclosures will need to be attached:
   - An adjacent PDU and UPS
   - An adjacent Battery Enclosure and UPS
   - Adjacent Battery Enclosures



4. Tighten the lock-nut and the bushing on the chase nipple.

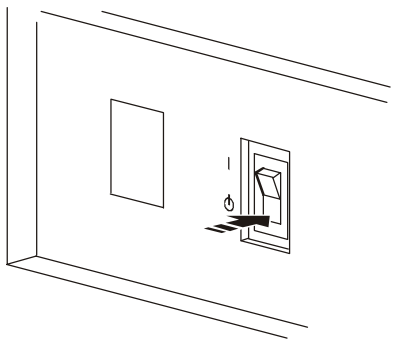
Ensure that All Power is Off

Before you proceed, ensure that power is off by following the procedure in this section.

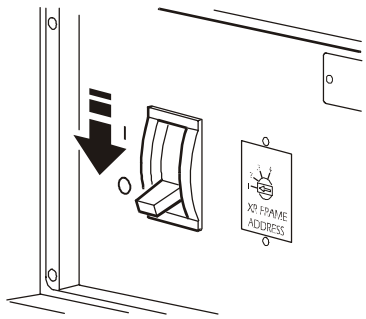
Do not install any batteries into the Battery Enclosure or power modules into the Symmetra PX UPS until instructed to do so.

How to ensure that all power is off

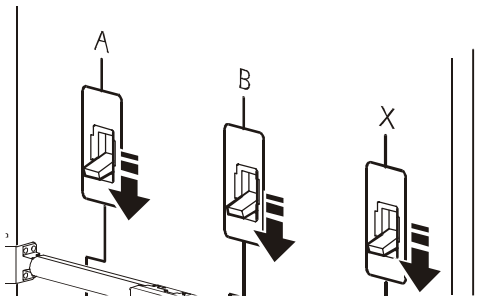
1. Set the UPS **System Enable** switch to OFF.



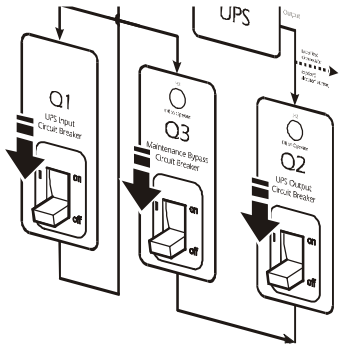
2. Set the Battery Enclosure **DC Disconnect** breaker to OFF (if applicable).



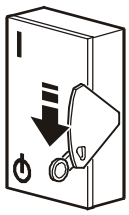
3. Set the **Main Input** (**A**) and **Bypass Input** (**B**) switches and the **Cross Tie Input** (**X**) breaker (if applicable) on the PDU to the OFF position.



4. Open (turn OFF) the **Q1**, **Q2**, and **Q3** breakers on the PDU.



5. Set the upstream utility disconnect to OFF.



Connect AC Power and Control Wiring

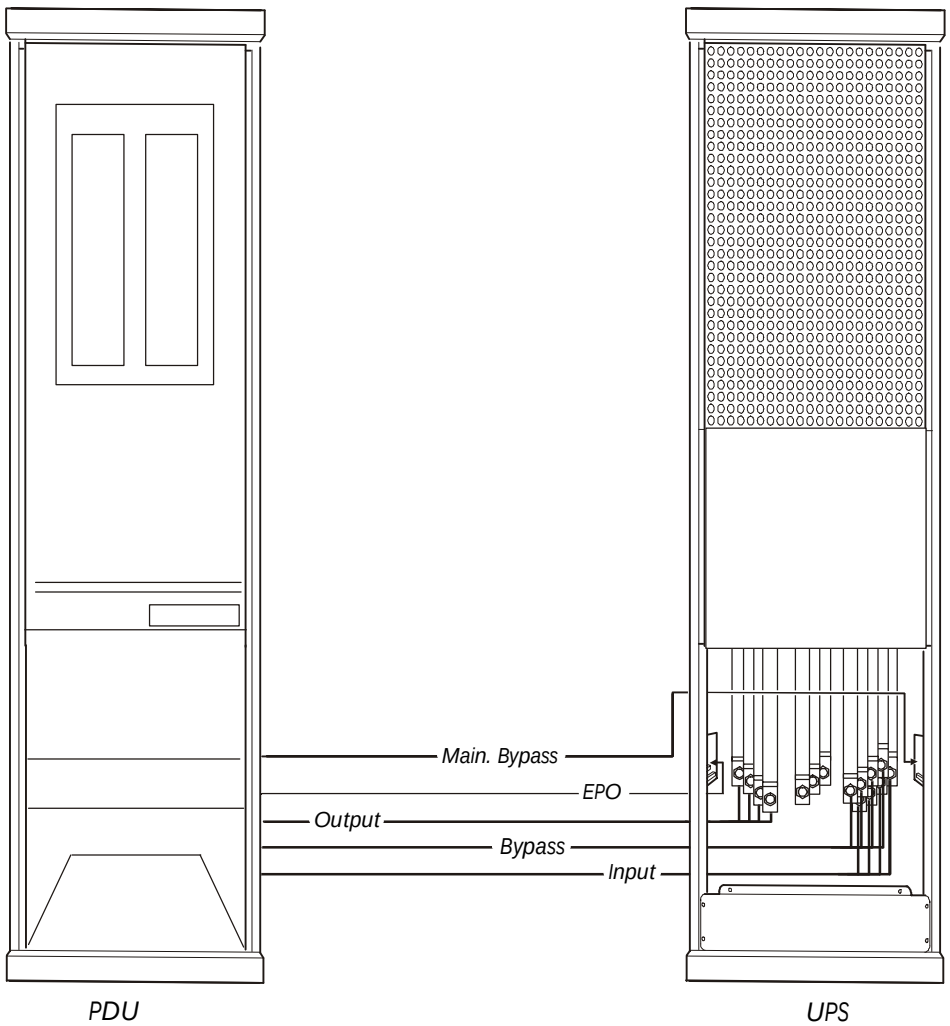
Note

Before you connect AC power and control wiring, connect utility power to the PDU. For instructions on how to connect utility power, see the utility connection sheet included with the PDU documentation.

Electrical Hazard

Only qualified personnel trained by APC may connect the AC power and control wiring.

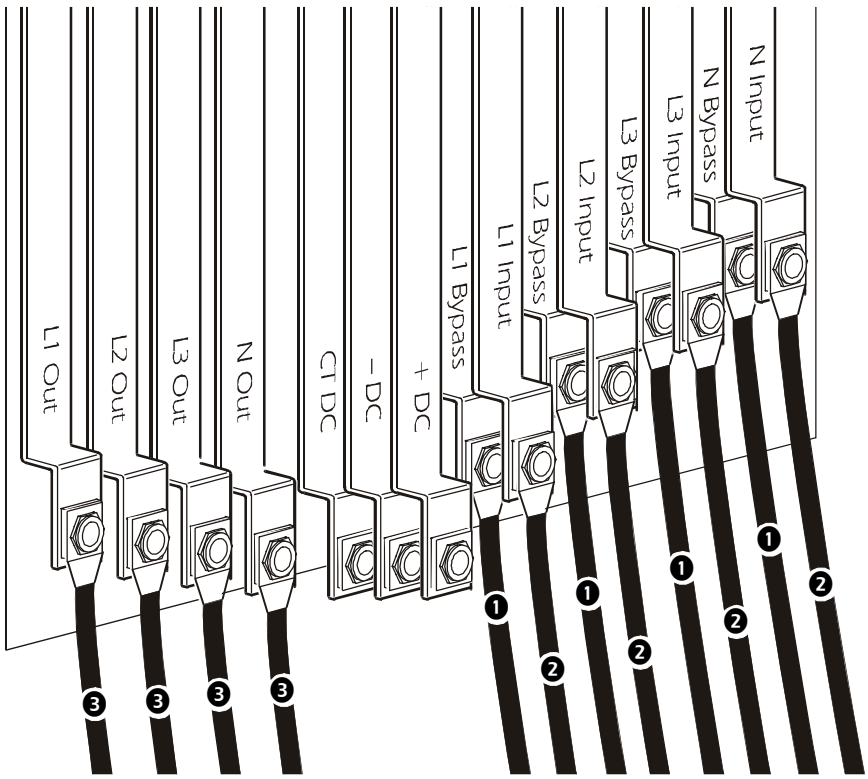
Attach AC power and control wiring to the UPS. The power wires are coiled in the bottom of the PDU. The PDU has five input wires and four output wires, and if you ordered the optional bypass feed, you will also have four wires for bypass connections. Each set of wires is labeled and color-coded. The control wires for the UPS Maintenance Bypass control board and the UPS EPO control board are also coiled in the bottom of the PDU. The diagram below provides an overview of the connections that you will make between the PDU and the UPS.



To make the connections you will need to remove the back lower panel of the UPS and the back panel of the PDU. Use the opening in the side panels of the enclosures to run the wires.

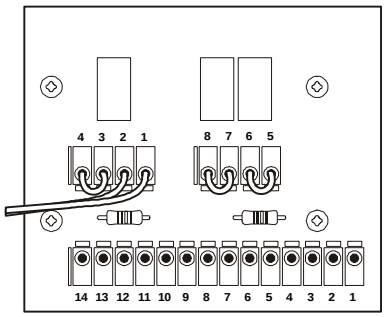
Connect AC power wiring.

1. If applicable, attach the **bypass** wires (**L1**, **L2**, **L3**, **N**) to the four UPS bypass bus bars with corresponding colors and labels (❶). This connection is made only when the PDU has a Bypass Input Switch.
2. Attach the **input** wires (**L1**, **L2**, **L3**, **N**) to the four UPS input bus bars with corresponding colors and labels (❷).
3. Attach the **output** wires (**L1**, **L2**, **L3**, **N**) to the four UPS output bus bars with corresponding colors and labels (❸).
   The following illustration shows the UPS buswork and the order in which you need to make the connections. The numbers in the illustration correspond to the the numbered steps above (1–3).



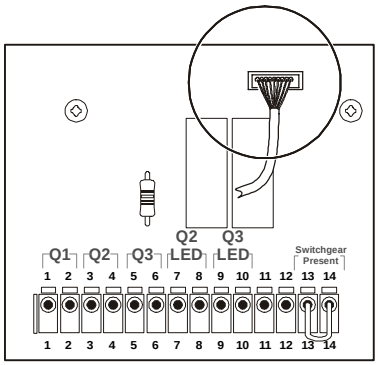
Connect control wiring.

4. Connect the EPO control wires from the PDU to the EPO board on the UPS.



EPO / PCB

5. Connect the Maintenance Bypass control wire harness from the PDU to the Maintenance Bypass interface board of the UPS. The wire harness's connector mates with the 12-pin terminal block on the board on the UPS.



MAINTENANCE BYPASS / PCB

Connect DC Power Wiring

Only qualified personnel trained by APC may connect the Battery Enclosure to the Symmetra PX UPS or to another Battery Enclosure.

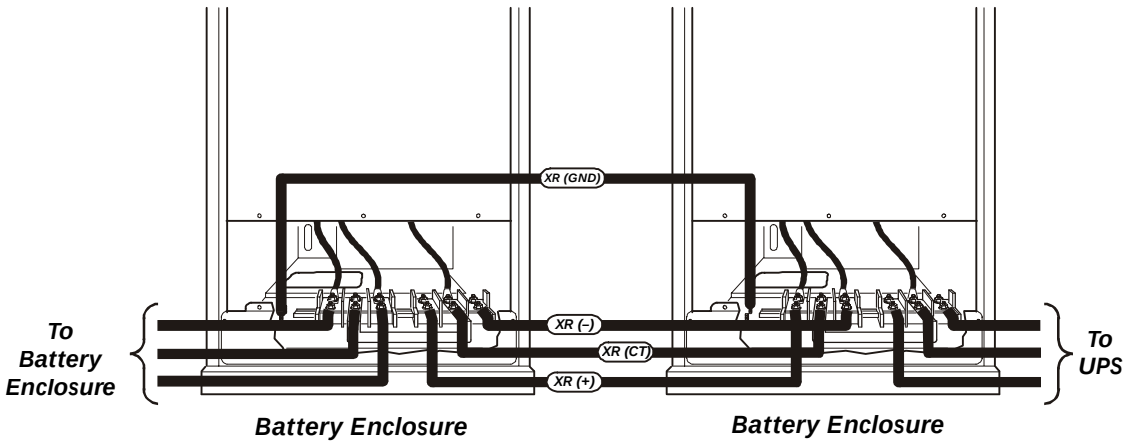
Power and ground wires provided are for internal side-panel wiring only. These wires are not for use in external conduits.

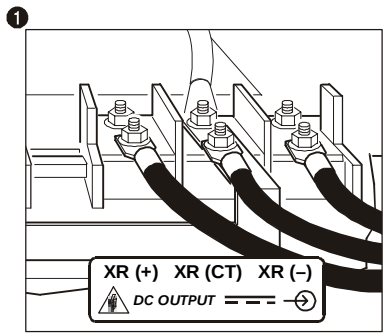
Wires provided are 1/0 AWG 75°C (167°F) rated copper wires. Cable lug type is YA25L2TC38. The recommended crimping tools are FCI, MD7-34R. Die is W25VT.

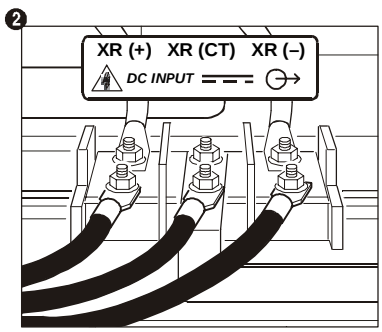
Cascade Battery Enclosures

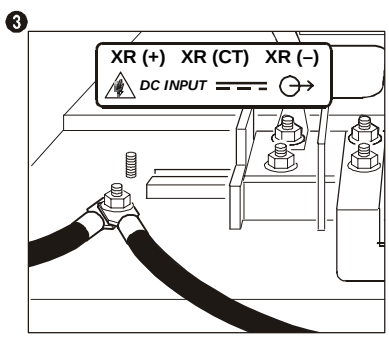
If you have multiple Battery Enclosures as part of your InfraStruXure system, you can cascade Battery Enclosures to form a "daisy-chain" to a Symmetra PX UPS. Starting with the Battery Enclosure furthest away from the UPS:

1. Route DC output cables and the ground cable (coiled on the floor of the enclosure) from one Battery Enclosure to the next Battery Enclosure through the adjacent holes in the side panels of the enclosures.
2. Connect the DC output cables from one Battery Enclosure to the DC Input Breaker of the next Battery Enclosure [(+) to (+), (CT) to (CT), (–) to (–)].
3. Connect the ground wire from one Battery Enclosure to the grounding stud on the next Battery Enclosure.







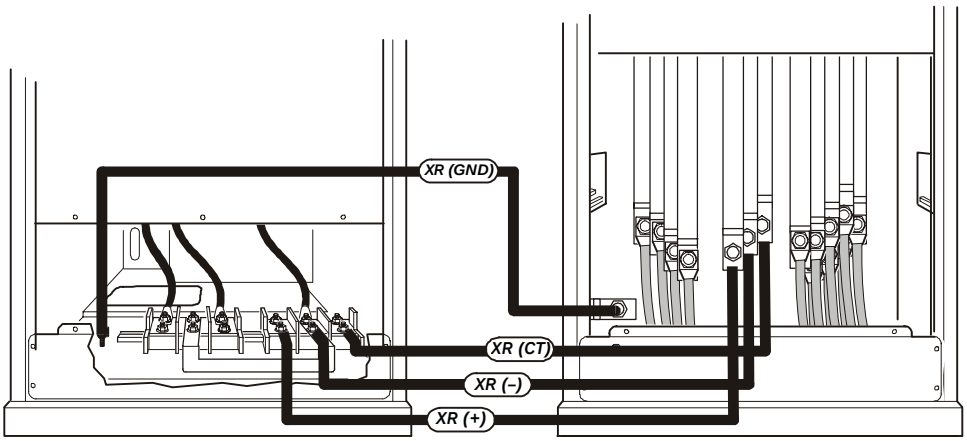


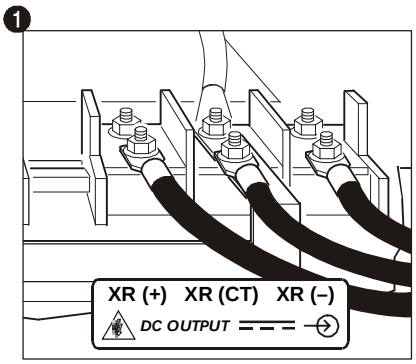
Connect power cables from the Battery Enclosure to the Symmetra PX UPS

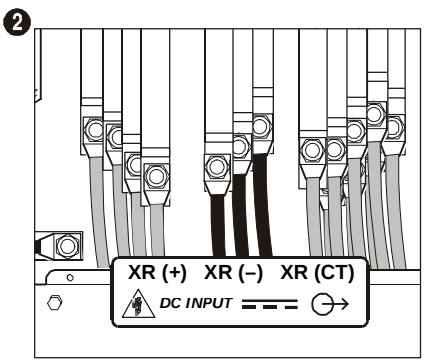
1. Route the Battery Enclosure DC output cables to the Symmetra PX UPS through the hole in the adjacent side panels.
2. Connect the Battery Enclosure DC output cables to the Symmetra PX UPS DC input terminal [(+) to (+), (CT) to (CT), (–) to (–)].

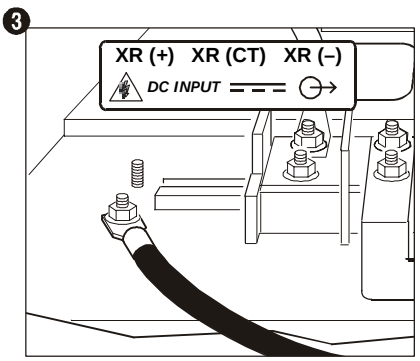
   Warning Tighten the lugs on the terminals only to the torque specified: the power terminal lug diameter is 8 mm with a torque value of 53 lb/in (6Nm).

3. Connect the Battery Enclosure ground cable to the Symmetra PX UPS ground stud.









Connect an Emergency Power Off Switch

Choose a connection method

Choose one of the following methods to connect a switch to the EPO interface:

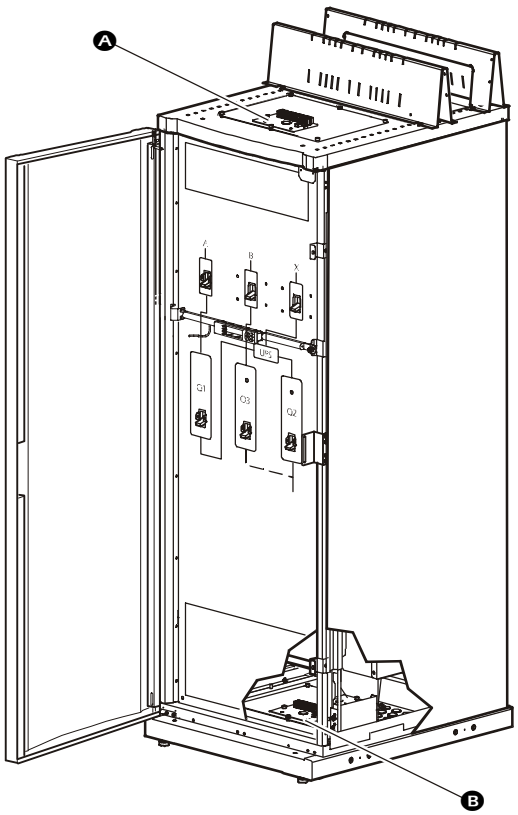
- 24 VDC
- 24 VAC
- Contact closure

Note

Choose only one connection.

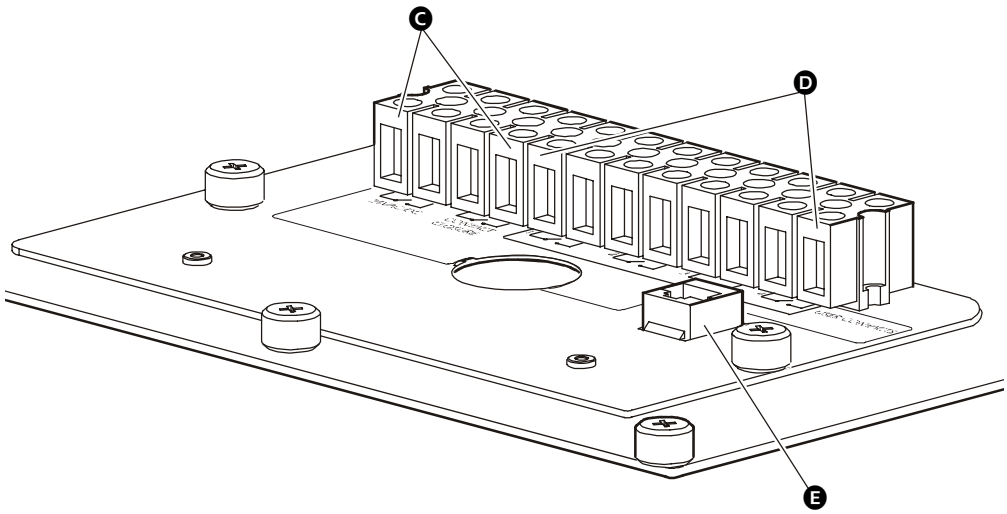
APC recommends a contact closure connection.

The EPO connections are made at the user connection plate. The figure at right shows the two possible locations of the user connection plate. It can either be mounted on the roof of the PDU enclosure (Ⓐ) or on the floor of the PDU (Ⓑ). Check your PDU for the exact location of the plate.



On the user connection plate, you can connect:

- An EPO switch (Ⓒ)
- User contact closure switches (Ⓓ)
- A network cable to the APC LAN (Ⓔ)



Connect a switch to the EPO interface

1. Connect the switch to the EPO interface on the monitoring unit. Read the label next to the terminal block to determine which terminals to use.

   Note The default setting on the EPO interface is for a normally open switch.

2. If you are attaching a normally closed switch, change the EPO DIP switch default setting from a normally open to a normally closed setting.
3. Ensure that the TEST/ARM rocker switch is in the ARM position on the monitoring unit.

Safety warnings

Hazardous voltage from the branch circuit must be isolated from the 24VAC, 24VDC and contact closure. 24VAC and 24VDC are considered Class 2 circuits as defined in Article 725 of the National Electrical Code (NFPA 70) and Section 16 of the Canadian Electrical Code (C22.1).

A Class 2 circuit is a source having limited voltage and energy capacity as follows:

a. If an Inherently Limited Power Source, voltage and energy are limited to < 30VAC, < 60VDC, 8A.

b. If Not an Inherently Limited Power Source, voltage and energy are limited to < 30VAC, < 60VDC, 250VA, and the current is limited to 1000/Vmax. The fuse is limited to 5A if < 20VAC or 20VDC, or 100/Vmax if < 30VAC or 60VDC.

If you choose to use a 24VAC, 24VDC or contact closure connection to the EPO, use one of the following UL-Listed wire types:

- CL2 Class 2 cable for general purpose use; or
- CL2P Plenum cable for use in ducts, plenums and other space used for environmental air; or
- CL2R Riser cable for use in a vertical run shaft from floor to floor; or
- CL2X Limited Use cable for use in dwellings and for use in raceway.
- For installation in Canada, the cable should be CSA Certified, type ELC (extra-low-voltage control cable).

If you do not use a CL2 cable, route the EPO wiring in conduit that does not contain any hazardous branch circuit wiring.

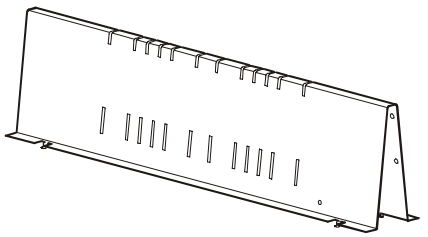
Install Shielding Troughs and Shielding Partitions

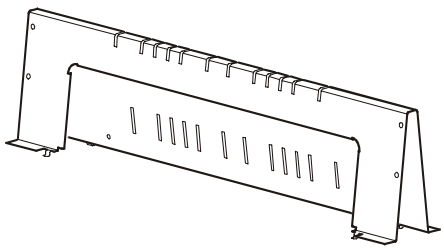
Shielding Troughs and Shielding Partitions for overhead wiring along rows

If you ordered APC Shielding Troughs, Shielding Partitions, and Cable Ladders to route overhead wiring for your system, assemble the Shielding Troughs and the Shielding Partitions along the rows of enclosures and assemble the Cable Ladders between rows.

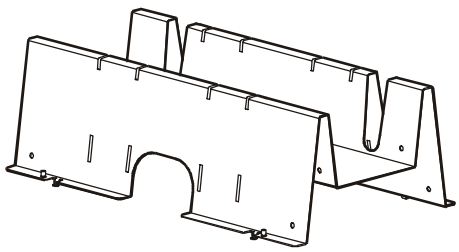
Shielding Troughs. There are two types of Shielding Troughs:

The PDU Wide Shielding Trough sits on top of the PDU with System Bypass. The PDU Shielding Trough is two peices. The power cables sit in between the two pieces when installed on the roof of the PDU.



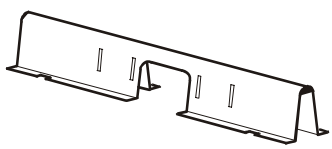


The NetShelter Shielding Trough is two feet (61 cm) in length and is not adjustable. Each Shielding Trough has an opening in each side through which you route data cables to the Shielding Partitions.

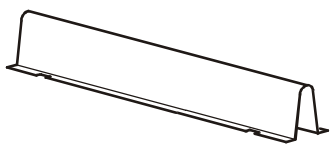


Shielding Partitions. There are two types of Shielding Partitions, each of which forms a side wall of a trough for data cables. You can customize the width of the trough for each row of your system — wider for rows carrying many data cables, narrower for rows carrying fewer.

As the back wall, use a Shielding Partition that contains an opening for routing data cables.



As the front wall, use solid Shielding Partitions to hide data cables for a clean appearance.



Install Shielding Troughs

Use the procedure in this section for both the PDU and NetShelter Shielding Troughs. Make sure you install the PDU Shielding Trough on the PDU with System Bypass.

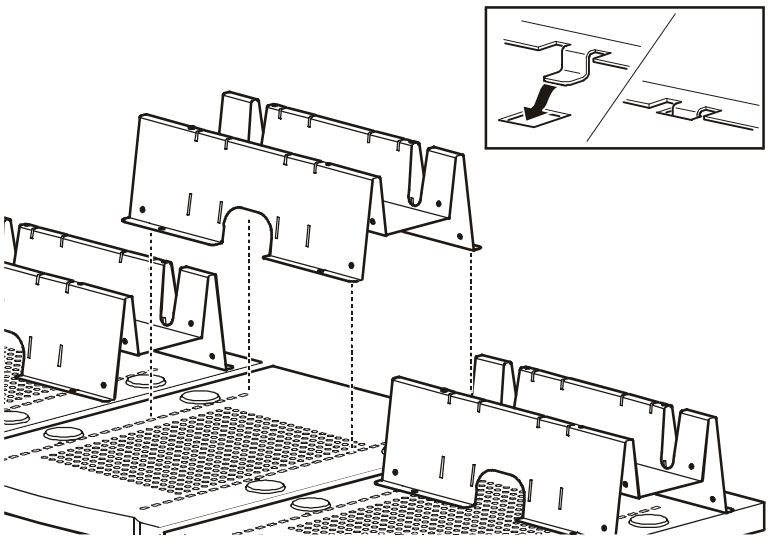
NetShelter Shielding Trough:

Note

When installing NetShelter Shielding Trough**s**, be sure that the opening for routing data cables is facing the front of the enclosure.

Install Shielding Troughs along the back edge on the roof of each row of enclosures. To install:

1. Insert the rear set of fastening tabs into the square holes along the back of the roof.
2. Squeeze the sides of the Shielding Trough towards each other at the bottom to insert the front fastening tabs.

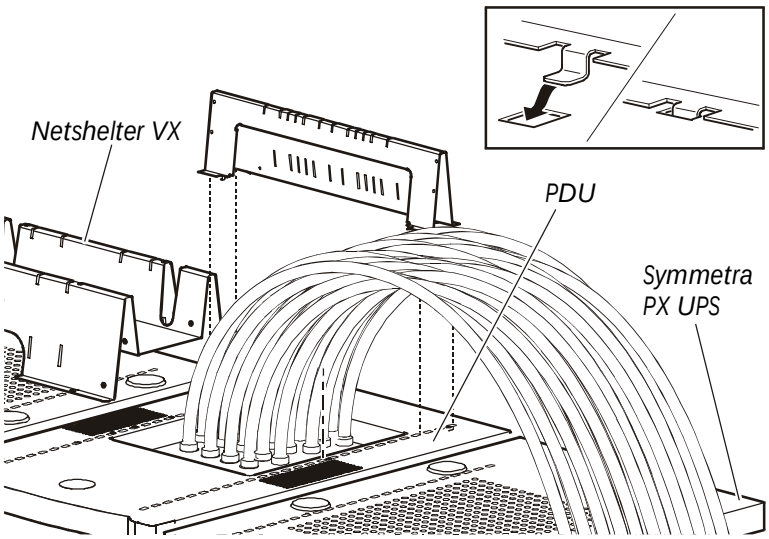


PDU Wide Shielding Trough:

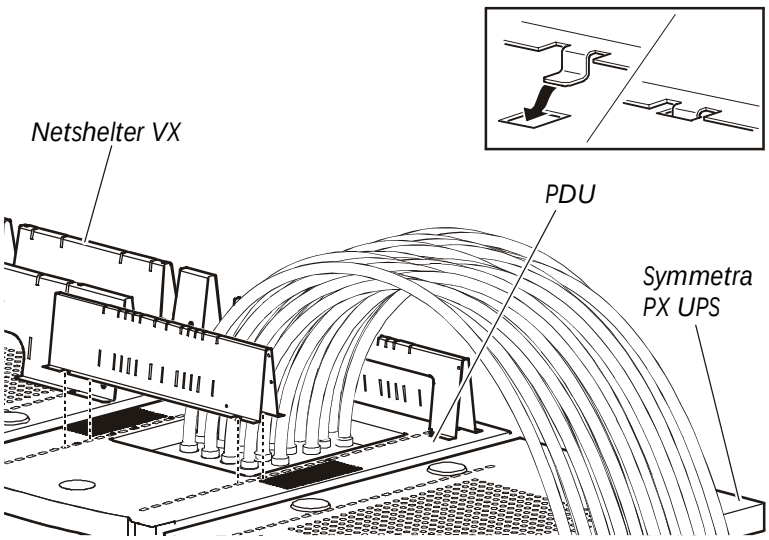
Note

When installing a PDU Shielding Trough, drape the power cables (whips) over the UPS as shown. After you have finished installating the Shielding Troughs in the row, route the power cables using the Shielding Troughs.

1. Squeeze the two sides of the PDU Shielding Trough to insert the fastening tabs into the set of square holes at the back of the roof of the enclosure.



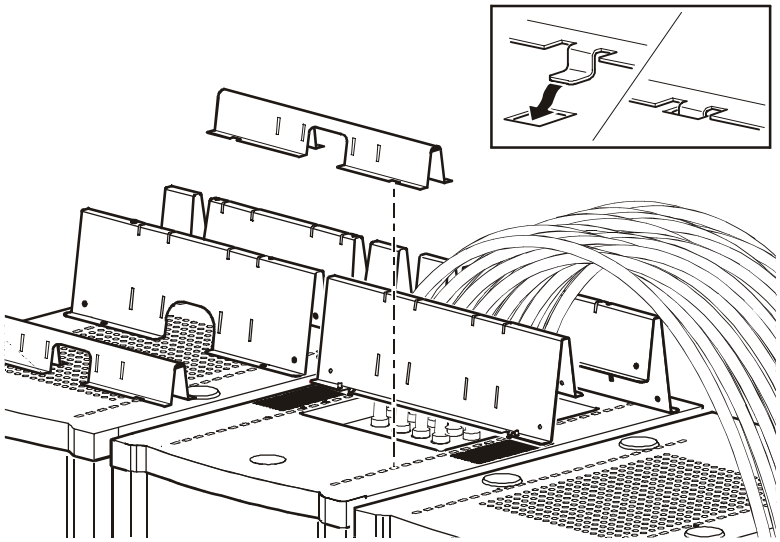
2. At the width you need for the power cables exiting the PDU, install the other side of the Shielding Trough in the same manner toward the front of the roof of the enclsoure.



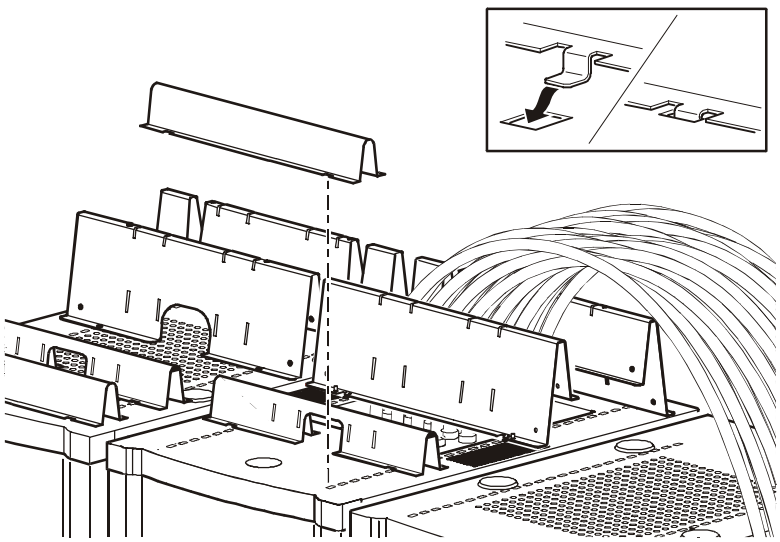
Install Shielding Partitions

Use the procedure in this section to install all Shielding Partitions. You can install Shielding Partitions on any enclosure.

1. Squeeze the two sides of a Shielding Partition to insert the fastening tabs into the set of square holes toward the back of the roof of the enclosure, next to the Shielding Troughs already installed.



2. At the width you need for the data cable trough, install the other Shielding Partition in the same manner at the front of the roof of the enclsoure.



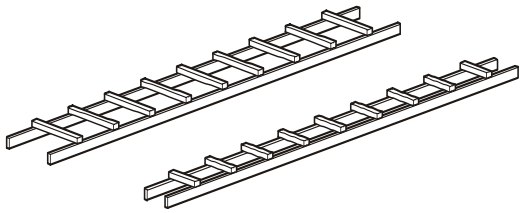
Install Cable Ladders

Cable Ladders for overhead wiring across rows

After installing the Shielding Troughs and Shielding Partitions, install the Cable Ladders between rows of enclosures.

Note Multiple rows of enclosures require a Cable Ladder.

Use wide Cable Ladders (12 in; 30.5 cm) where many power cables or data cables will run between rows; use narrow Cable Ladders (6 in; 15.2 cm) where few power cables or data cables will run between rows.



The Cable Ladders are 9 feet and 8 inches long. You can adjust the length of the Cable Ladders in the following ways:

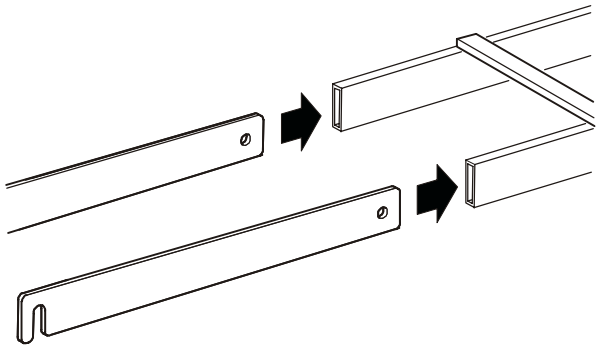
- Cut the ends with a hacksaw to shorten them.
- Insert the connectors only partially into the side rails to extend them.

Note Do not change the spacing between rows or the length and position of the Cable Ladders from the layout you planned with your APC representative when you placed your order. For overhead wiring, each PDU power cable is provided at a pre-determined length. Changes to the physical configuration of your system could cause some PDU power cables to be too short or too long.

Install Cable Ladders across rows

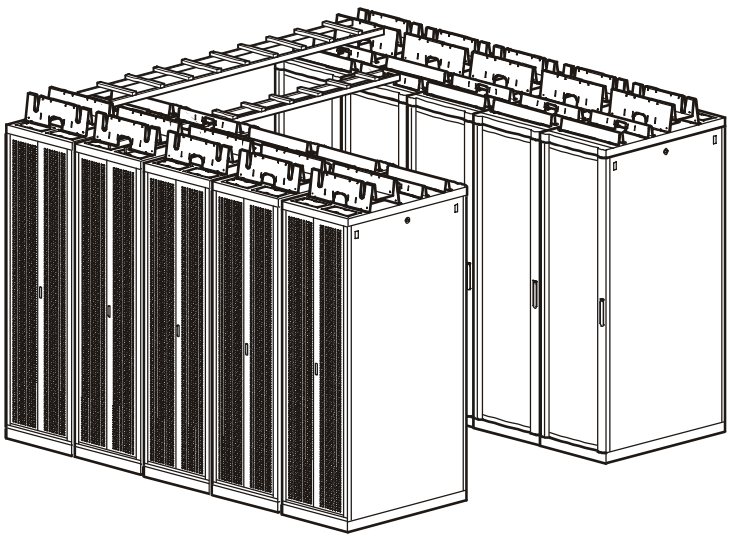
To install the Cable Ladders for typical configurations:

1. On each side rail of the Cable Ladders, insert a ladder bracket.



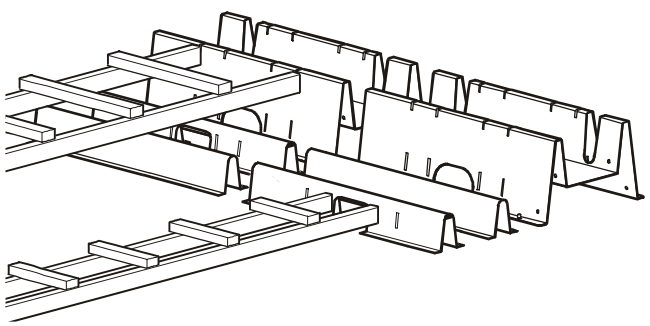
2. Attach the Cable Ladders to the Shielding Troughs or Shielding Partitions according to whether your enclosures are facing front-to-front or back-to back. For example:

   Enclosures that face front-to-front:

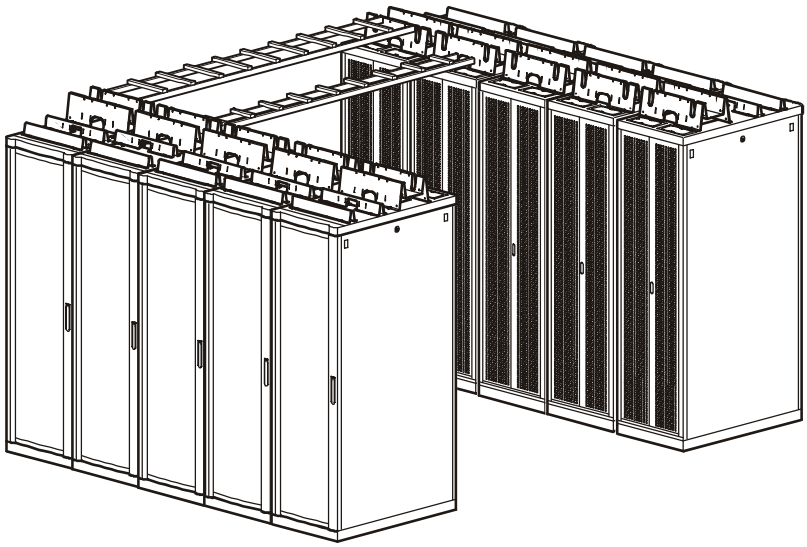


   Attach a wide Cable Ladder to the slots in the top of the Shielding Trough. The Cable Ladder runs above the Shielding Partition, and carries power cables between rows.

   Attach a narrow Cable Ladder between the Shielding Partitions that have openings for routing data cables into the data cable trough.

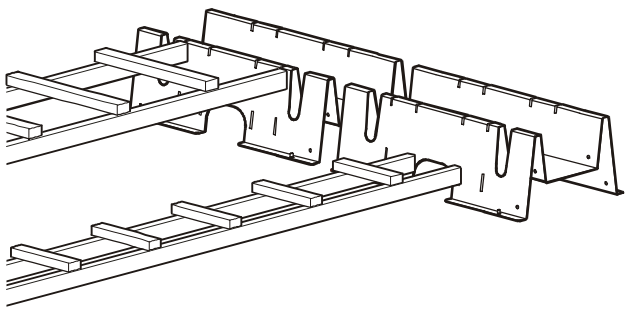


Enclosures that face back-to-back:



Attach a wide Cable Ladder to the slots in the top of the Shielding Trough to route power cables into the Shielding Troughs.

Attach a narrow Cable Ladder to the slots in the middle of a Shielding Trough to route data cables under the Shielding Trough and into the data cable trough.



Install InfraStruXure Rack-mount Devices

Install the Rack Automatic Transfer Switches (ATS)

Install a Rack ATS in the top of each enclosure for overhead wiring, and in the bottom of each enclosure for wiring under the floor.

See also

See the installation instructions in the manual included with your Rack ATS.

Install the Rack Power Distribution Units (PDU)

Install Rack PDUs in the rear of the NetShelter VX enclosure, in the channel directly behind the rear vertical mounting rails. For overhead wiring, make sure that the power cord is pointing toward the roof of the enclosure. For under the floor wiring, make sure that the power cord is pointing toward the floor.

See also

See the installation instructions in the manual included with your Rack PDU.

Install the InfraStruXure Manager and Hub (or Switch)

Install the InfraStruXure Manager in the enclosure closest to the PDU with System Bypass. The CAT-5 data cables included with your configuration are at varying lengths, based on the distance components will be installed from the PDU with System Bypass.

See also

See the installation instructions in the manual included with your InfraStruXure Manager.

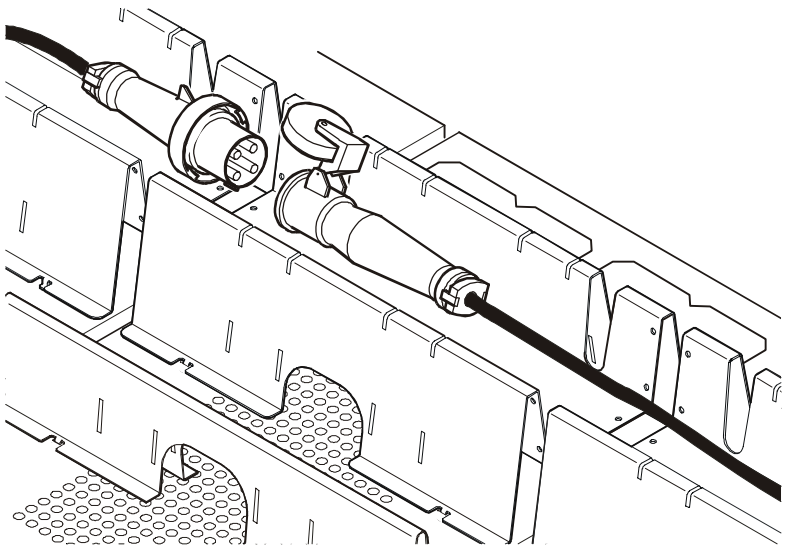
Install the remaining APC rack-mounted devices

Install the remaining devices according to the installation instrcutions in the manual included with each device.

Route and Attach Overhead Wiring

Route and attach RDP power cables

If you have an Remote Distribution Panels (RDPs) as part of your system, connect the RDP power cable on the RDP to the RDP power cable on the PDU. The RDP cable terminates with an IEC 309 plug and the PDU cable terminates with an IEC 309 outlet.



Note

If you ordered the alternative connection (your PDU and RDP power cables do not terminate with IEC connectors), see the manual included with your RDP for instructions on making the alternate connection between the RDP and the PDU.

Route and attach power cables to equipment racks

If you ordered overhead wiring, connect the prewired power cables of the PDU with System Bypass as follows:

1. Install the Shielding Troughs, Shielding Partitions, and Cable Ladders so that you can route power cables from the PDU to the NetShelter VX Enclosures.

   For installation instructions, see “Troughs and partitions for overhead wiring along rows” on page 30.

2. Find the numbers that indicate the enclosure to which each power cable will supply power. These numbers appear on the roof of the PDU where the power cables exit, and they also appear on the ends of each power cable.

Note

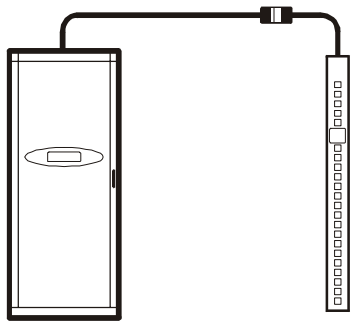
The enclosures are not numbered. Consult your APC InfraStruXure Configuration Buildout Tool to determine the enclosure associated with each power cable.

3. Beginning with the power cables for the enclosures farthest from the PDU, run each power cable within the Shielding Trough along the row and, if necessary, across one or more Cable Ladders to the enclosure to which it will provide power.

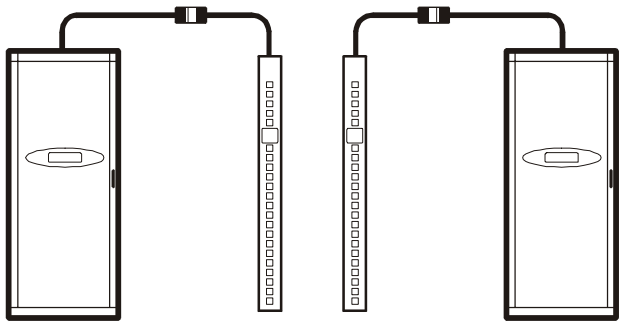
Note

Ensure that the L21-20 twist-lock connector at the end of each power cable always lies on top of any longer power cables in the Shielding Trough.

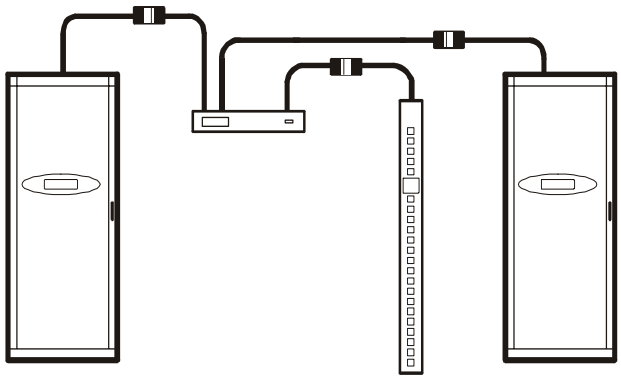
4. Connect the appropriate power cable to APC power management equipment in the enclosure in one of the four following ways:
   – *For single-feed devices without redundancy*: attach a power cable directly to a Rack PDU installed in a NetShelter VX Enclosure.



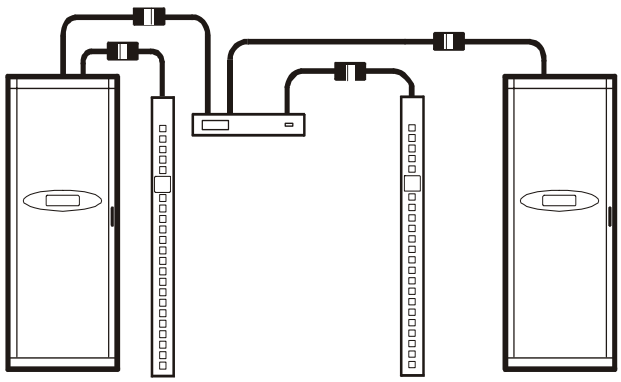
   – *For dual-feed devices within a redundant system*: attach a power cable from each PDU into two different Rack PDUs in the NetShelter VX Enclosure.



– *For single-feed devices within a redundant system with an Automatic Transfer Switch*: connect a power cable to the Automatic Transfer Switch (A and B feeds) and connect the Automatic Transfer Switch power cord to a Rack PDU in the NetShelter VX Enclosure.



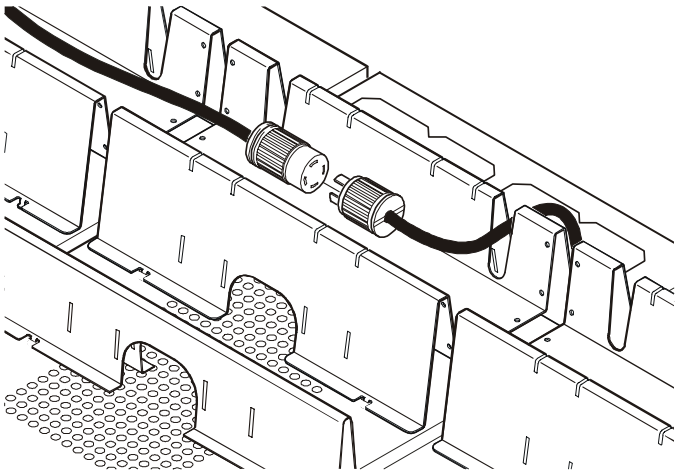
– *For dual-feed devices in a redundant system with an* Automatic Transfer Switch: connect a power cable from each PDU to the Automatic Transfer Switch's A and B feeds, and another power cable from one PDU to a Rack PDU, and the Automatic Transfer Switch's power cord to a second Rack PDU in the NetShelter VX Enclosure.



Note

Lay the cables neatly in the Shielding Trough to minimize cable build-up.

5. From each NetShelter VX Enclosure, run the power cable of the appropriate APC power management device out the roof of the enclosure, through the notch in the rear side of the Shielding Trough, to the connector of the appropriate power cable from the PDU. Plug the two connectors together, and twist them clockwise to lock.



Route Data Cables to the InfraStruXure Manager Hub (or Switch)

Connect network cables to components

1. Connect a Cat-5 network cable (provided) to the network or 10Base-T ports on your APC InfraStruXure devices. The following devices need to be connected:
   – Automatic Transfer Switch
   – Symmetra PX UPS
   – Rack PDU
   – Environmental Monitoring Unit
   – PDU monitoring unit

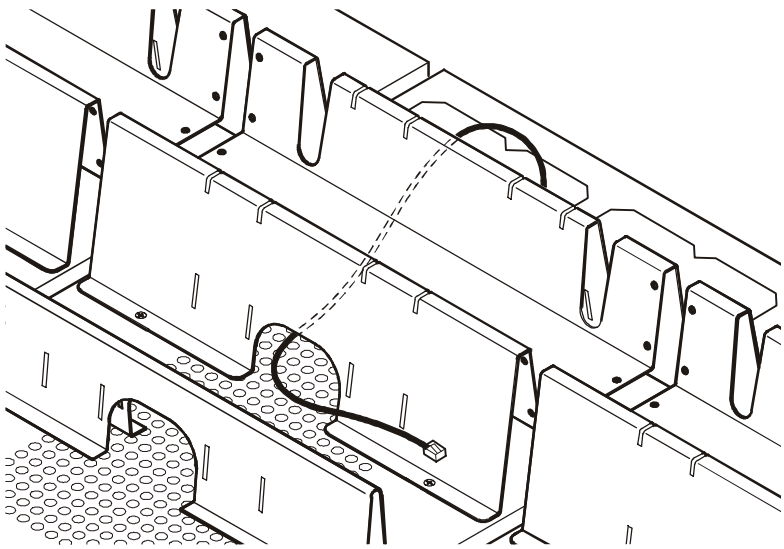
Route network cables to the InfraStruXure Manager Hub (or Switch)

Overhead routing.

1. Install Shielding Partitions and Cable Ladders.

See “Cable Troughs, Partitions, and Ladders” on page 30.

2. Run the Cat-5 network cables (provided) from each APC device to the InfraStruXure Manager Hub.
   a. Start with the device farthest from the enclosure housing the InfraStruXure Manager and Hub (or Switch), and use the longest supplied Cat-5 cable.
   b. Bundle cables together and run the bundles in the data cable troughs along rows and across Cable Ladders, if necessary.



3. Connect each APC device’s network cable to any available station port in the InfraStruXure Manager Hub (or Switch). Station ports are those with an *x* after the number (e.g., 2x).

Start-Up Procedure

Safety Warnings

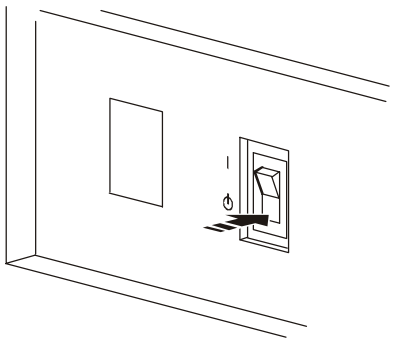
This section provides instructions on how to perform a system start-up. Do not skip any steps in this procedure.

Only qualified, APC-trained personnel may perform a system start-up.

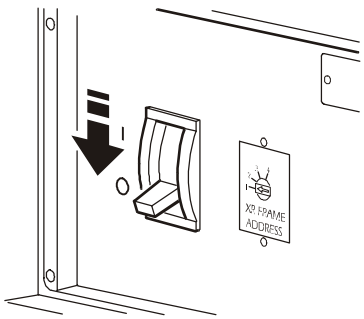
Do not install any batteries into the Battery Enclosure or power modules into the Symmetra PX UPS until instructed to do so.

Ensure that All Power is Off

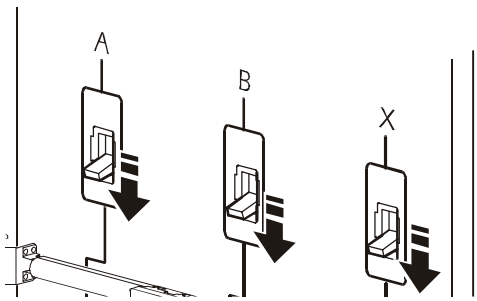
1. Set the UPS **System Enable** switch to OFF.



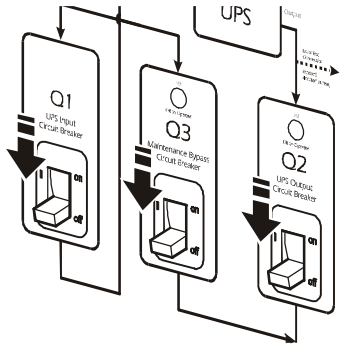
2. Set the Battery Enclosure **DC Disconnect** breaker to OFF (if applicable).



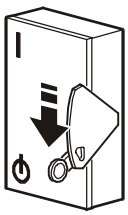
3. Set the **Main Input** (**A**) and **Bypass Input** (**B**) switches and the **Cross Tie Input** (**X**) breaker (if applicable) on the PDU to the OFF position.



4. Open (turn OFF) the **Q1**, **Q2**, and **Q3** breakers on the PDU.

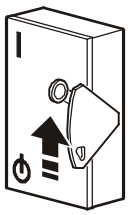


5. Set the upstream utility disconnect to OFF.

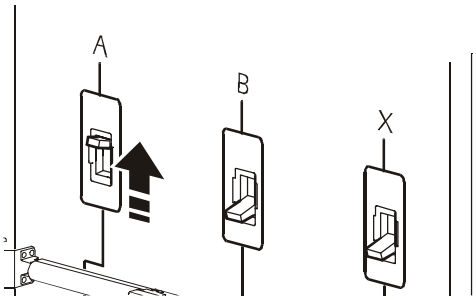


Apply Power to the System

1. Set the upstream utility breaker to ON.

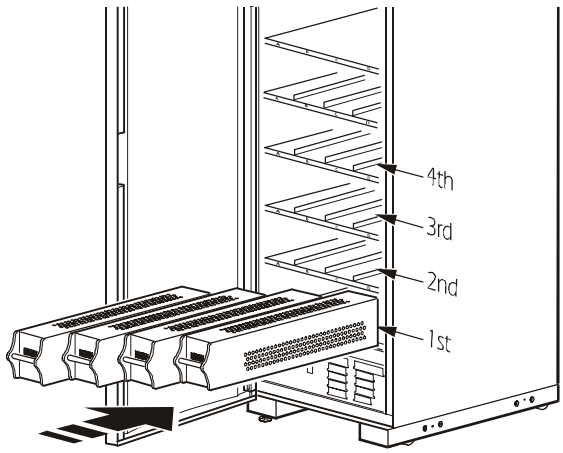


2. Ensure A-B-C clockwise phase rotation at the top of the **Main Input** (**A**) switch on the PDU, using a phase rotation meter.
3. Set the **Main Input** (**A**) switch on the PDU to ON.



4. Verify A-B-C clockwise phase rotation at the top of the primary winding of the transformer, using a phase rotation meter.
5. Verify that the proper voltage is present on the secondary winding of the transformer (208 V, metered phase-to-phase), using a true RMS voltmeter.
6. Install at least one battery module (four battery units) in the Battery Enclosure.

   Install battery modules, starting in the lowest available shelf. Position the battery unit between the grooves, and push it completely into the enclosure.

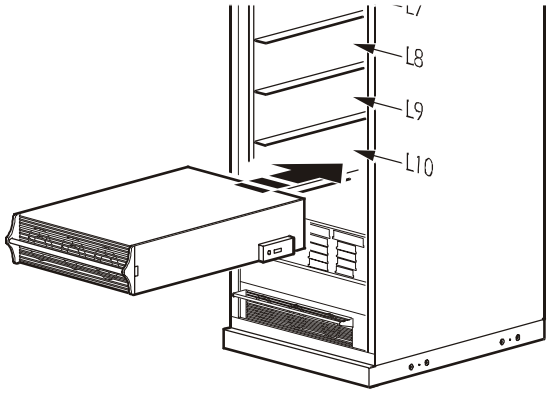


Electrical Hazard

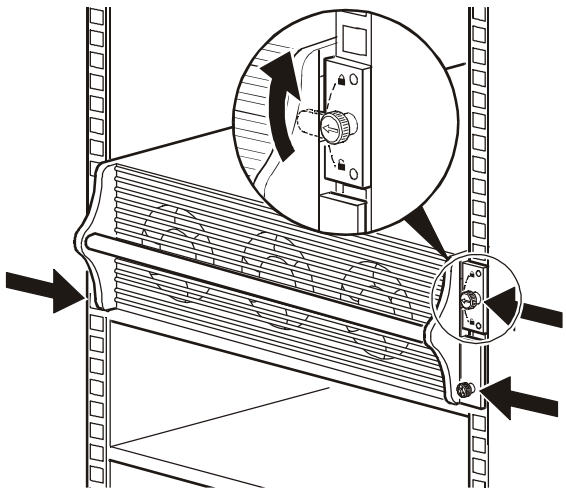
The DC bus in the Battery Enclosure is energized when battery modules are installed, even when the DC Disconnect breaker is open.

7. Install at least one power module in the Symmetra PX UPS.

   Install power modules starting from the lowest available shelf. Push each module completely into the enclosure.



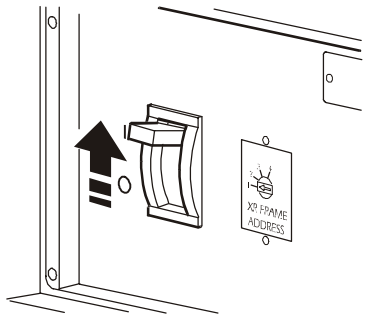
8. Secure the power module:
   a. Tighten the screws on each side of the power module.
   b. Turn the locking latch clockwise until the arrow on the knob faces the power module.



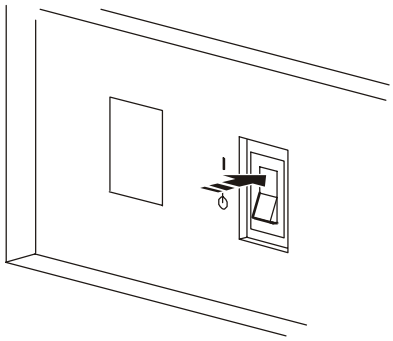
Note

The power module will not start unless the locking latch is engaged.

9. Set the Battery Enclosure **DC Disconnect** breaker to ON.



10. Set the UPS **System Enable** switch to ON.



When the **System Enable** switch is in the ON position, the Startup screen appears on the display interface of the Symmetra PX UPS and then,

```
PowerView RM
Rev: 000 English
Please wait...
```

the top-level status screen appears on the display interface. This may take up to 40 seconds.

```
Fuel %   ||||||||||||
Load %   |||
In 208V out000V 60Hz
Runtime: 1hr 2m
```

Start the UPS Using the Display Interface

1. Read the messages displayed on the Symmetra PX UPS display interface:
   Note any alarms and verify that they are appropriate for start-up conditions.

Top-Level Status Screen

```
Fuel %   ||||||||||||
Load %   |||
In 208V out000V 60Hz
Runtime: 1hr 2m
```

2. Command the UPS to apply power to the load:
   a. Press the ESC key to open the top-level menu.
   b. Select **Control** and press the ENTER key.

Top-Level Menu

```
➡ Control      Logging
  Status       Display
  Setup        Diags
  Accessories  Help
```

   c. Select **Turn Load On/Off** from the **Control** menu and press the ENTER key.

Control Menu

```
  UPS Into Bypass
  Do Self Test
  Simulate Power Fail
  Graceful Reboot
```

```
  Graceful Turn Off
  Start Runtime Cal
➡ Turn Load On
```

   d. On the next screen: select **Yes, UPS Load ON** and press the ENTER key.

Confirmation Screen

```
  Confirm
➡ Yes, UPS Load ON
  No, Abort
```

   The interface will display the following screen:

```
   UPS has been
commanded to turn
 load power on...
```

   The interface will display the following fault message:
   e. Select **Start up on Batt** and press the ENTER key.

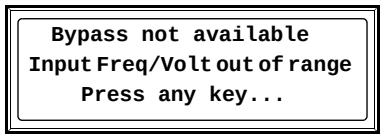
```
   Low/No AC input
➡ Start up on Batt?
  Start Now
```

   The interface will display the following screen:

```
   UPS has been
commanded to turn
 load power on...
```

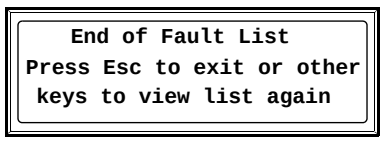
The UPS interface displays the following fault screen:

f. Press any key.

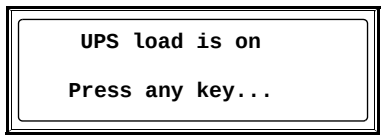


The UPS interface displays the following fault screen:

g. Press the ESC key.

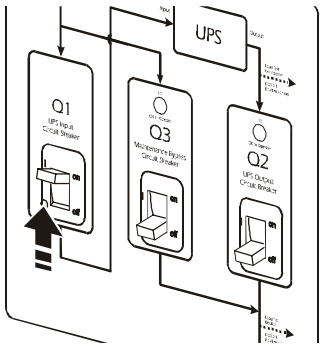


The LOAD ON LED illuminates and the interface displays the following screen:



Continue Start-up at the PDU

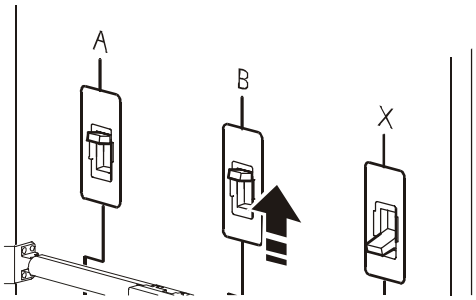
1. Close (turn ON) the **Q1** breaker on the PDU with System Bypass to apply power to the UPS.



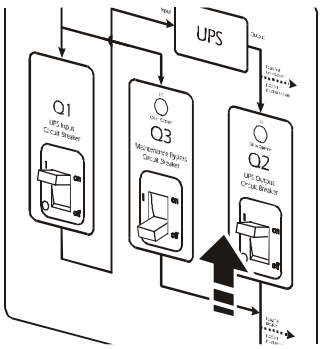
2. Ensure A-B-C clockwise rotation at the UPS input bus bars, using a phase rotation meter.
3. Verify proper voltage is present at the UPS input bus bars (208 V, metered phase-to-phase) using a True RMS voltimeter.
4. Ensure A-B-C clockwise rotation at the PDU Bypass terminal block, using a phase rotation meter.
5. Verify proper voltage is present at the PDU Bypass terminal block (208 V, metered phase-to-phase) using a True RMS voltimeter.

The voltage for the bypass feed can only be 208 V, phase-to-phase.

6. Set the PDU Bypass Input (B) switch to ON.



7. Ensure A-B-C clockwise rotation at the UPS Bypass bus bars, using a phase rotation meter.
8. Verify proper voltage is present at the UPS Bypass bus bars (208V, metered phase-to-phase) using a True RMS voltimeter.
9. Close (turn ON) the Q2 breaker on the PDU.



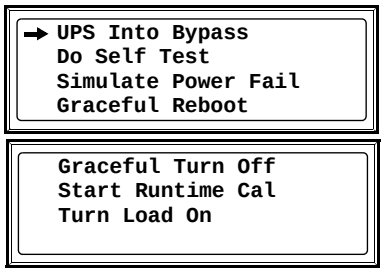
Verify Proper Phasing

Place the UPS into bypass operation

1. Command the UPS into static bypass operation through the UPS display interface:
   a. Press the ESC key at to open the top-level menu.
   b. Select **Control** on the top-level menu and press the ENTER key.

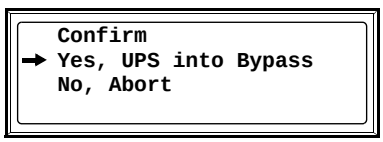
Top-Level Menu

Control Menu



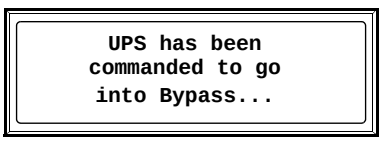
   c. Select **UPS Into Bypass** on the **Control** menu and press the ENTER key.

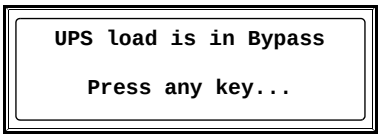
Confirmation Screen



   d. On the next screen: select **Yes, UPS into Bypass** and press the ENTER key.

The BYPASS LED illuminates and the following screens appear:





Note

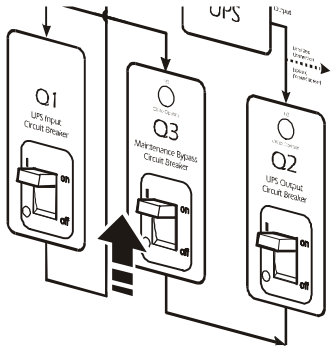
The **H3** LED above the **Q3** breaker illuminates, but do not operate the breaker.

2. Use a true RMS voltmeter to make sure that there is no difference in potential between L1 IN and L1 OUT, L2 IN and L2 OUT, and L3 IN and L3 OUT on the Q3 breaker. The Q3 breaker must be in the OFF position. The top side of Q3 will be utility voltage and the bottom side of Q3 will be the voltage from the UPS in static bypass. Voltage should be less than 2 volts.

Note

Q3 is a 4-pole breaker. Be sure to measure L1 to L1, L2 to L2, and L3 to L3.

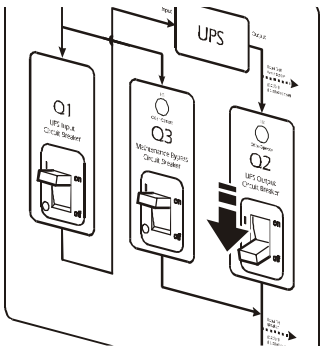
3. Close (turn ON) the **Q3** breaker on the PDU with System Bypass.



Note

The **H2** LED above the **Q2** breaker illuminates, indicating that it is safe to operate the **Q2** breaker.

4. Open (turn OFF) the **Q2** breaker on the PDU with System Bypass.



The UPS will display a Forced Bypass message on the display interface and the Fault LED will be red.

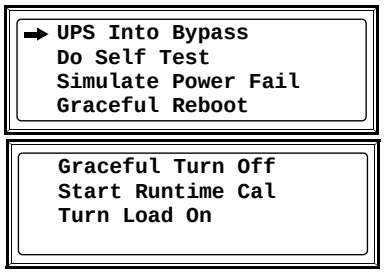
Return from maintenance bypass operation

1. Command the UPS into static bypass operation through the UPS display interface:
   a. Press the ESC key at to open the top-level menu.
   b. Select **Control** on the top-level menu and press the ENTER key.

Top-Level Menu

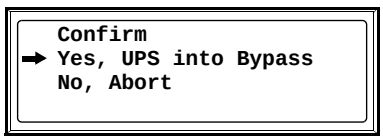
   c. Select **UPS Into Bypass** on the **Control** menu and press the ENTER key.

Control Menu



   d. On the next screen: select **Yes, UPS into Bypass** and press the ENTER key.

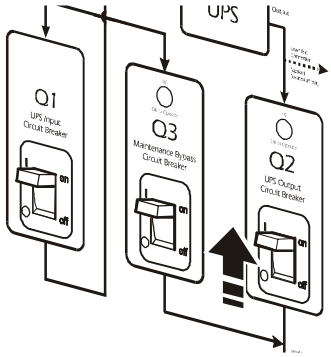
Confirmation Screen



Note

The **H2** LED above the **Q2** breaker illuminates, indicating that it is safe to operate the **Q2** breaker.

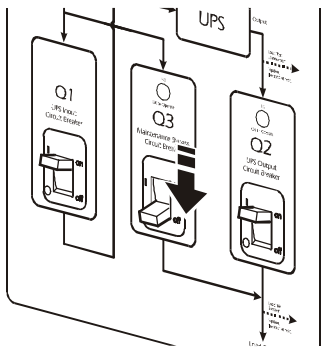
2. Close (turn ON) the **Q2** breaker on the PDU with System Bypass.



The **H3** LED above the **Q3** breaker illuminates, indicating that it is safe to operate the **Q3** breaker

3. Open (turn OFF) the **Q3** breaker on the PDU with System Bypass.

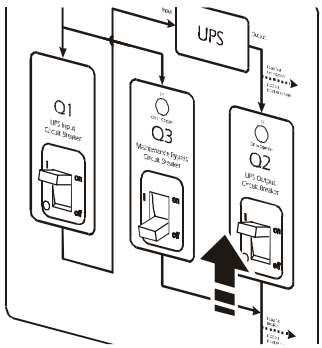
   The UPS automatically returns from Static Bypass.



Power the PDU Distribution Breakers

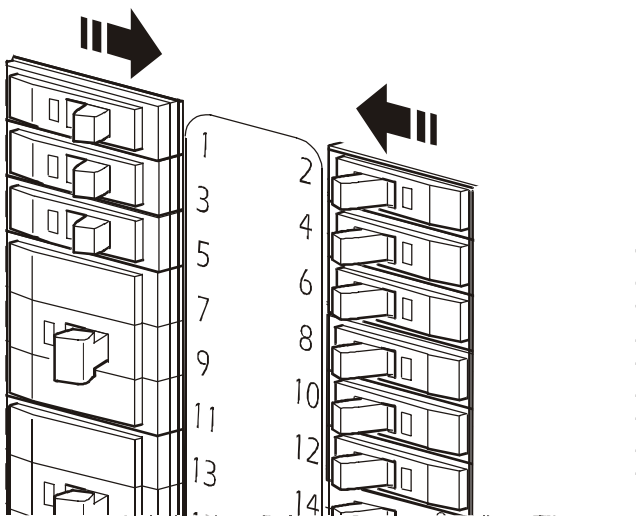
1. Ensure that the **Q2** breaker on the PDU is closed (ON).

Note When **Q2** is closed, both PDU distribution panels are energized.



2. Close (turn ON) the PDU **distribution panel** breakers.

Note When the distribution panel breakers are closed, the PDU power cables and connected equipment are energized.



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